IN THE CLAIMS:

This listing of claims will replace all prior versions, and listing, of claims in the application.

Listing of the Claims:

1. (Currently amended) A method for non-invasive monitoring of electrical muscular activity which is at least partially due to a non-stationary muscular source, the method incorporating the steps of:
   a) providing a blind signal separation technique suitable for separating stationary signals,
   b) placing a plurality of low-noise signal electrodes externally upon a patient's skin for detection of electrical muscular activity, the signal electrodes being localised sufficiently such that:
      i) their muscular signal contributions simulate a single muscular source to the blind signal separation technique despite at least partial non-stationarity of the muscular source, and
      ii) the number of sources detected by the blind signal separation technique is not more than the number of signal electrodes; ~~and~~
   c) using computer apparatus to ~~applying~~ apply the blind signal separation technique to digital signals derived from signals received from the signal electrodes to separate the muscular source, and
   d) using a display device to display the separated muscular source to a user.

2. (Previously presented) A method according to Claim 1 wherein the muscular activity is uterine activity.

3. (Previously presented) A method according to Claim 1 wherein the blind signal separation technique is based on an algorithm of a kind known as an instantaneous algorithm and suitable for addressing blind signal separation problems referred to as instantaneous mixing problems, the instantaneous algorithm incorporating an assumption

that signals arrive synchronously at each sensor in a sensor array.

4. (Previously presented) A method according to Claim 3 wherein the instantaneous algorithm is independent component analysis (ICA).

5. (Previously presented) A method according to Claim 4 wherein the step of applying the blind signal separation technique applies ICA to processing data derived from signals from the signal electrodes, the data being arranged in successive overlapping blocks such that in pairs of adjacent blocks each subsequent block incorporates a proportion of the data in the respective preceding block, and a correlation scheme is applied to re-order independent sources derived in ICA processing of different blocks to correct for signal swapping.

6. (Previously presented) A method according to Claim 1 wherein the step of placing the signal electrodes comprises placing four or five signal electrodes at and above navel height with respect to an upright patient at positions close to the expected site of pacemaker activity.

7. (Previously presented) A method according to Claim 1 wherein the signal electrodes are a first set of signal electrodes and the step of placing the signal electrodes includes placing a second set of signal electrodes upon a patient's skin in positions not localised sufficiently for their muscular signal contributions to simulate a single source to the blind signal separation technique, and wherein the blind signal separation technique employs signals derived via the first set of signal electrodes for monitoring non-stationary muscular activity and signals derived via the first and second sets of signal electrodes for monitoring stationary muscular activity.

8. (Previously presented) A method according to Claim 7 wherein the non-stationary muscular activity is uterine activity, the stationary muscular activity is cardiac activity and the blind signal separation technique simultaneously acquires uterine activity and maternal and fetal cardiac activity

9. (Previously presented) A method according to Claim 8 wherein the blind signal separation technique acquires uterine activity, maternal muscle activity, fetal ECG and maternal ECG.

10. (Deleted).

11. (Previously presented) An apparatus according to Claim 19 wherein the non-stationary first muscular source is a uterine source.

12. (Previously presented) An apparatus according to Claim 19 wherein the blind signal separation technique is based on an instantaneous algorithm.

13. (Previously presented) An apparatus according to Claim 12 wherein the instantaneous algorithm is independent component analysis (ICA).

14. (Previously presented) An apparatus according to Claim 13 wherein the computer apparatus is programmed to arrange the digital signals in successive overlapping data blocks such that in pairs of adjacent blocks each subsequent block incorporates a proportion of the data in the respective preceding block, and to apply a correlation scheme to re-order independent sources derived in ICA processing of different blocks to correct for signal swapping.

15. (Previously presented) An apparatus according to Claim 19 wherein the first set of low-noise signal electrodes comprise four or five signal electrodes for placing at and above navel height with respect to an upright patient at positions close to the expected site of pacemaker activity.

16. (Previously presented) An apparatus according to Claim 19 wherein the blind signal separation technique is arranged to employ signals derived via the first set of signal electrodes for monitoring uterine activity and signals derived via the first and second sets of signal electrodes for monitoring maternal and fetal cardiac activity.

17. (Previously presented) An apparatus according to Claim 16 for monitoring uterine activity wherein the blind signal separation technique is arranged to acquire maternal and fetal cardiac activity simultaneously.

18. (Previously presented) An apparatus according to Claim 16 wherein the blind signal separation technique is arranged to acquire uterine activity, maternal muscle activity, fetal ECG and maternal ECG.

19. (Currently amended) An apparatus for non-invasively monitoring electrical muscular activity which is partly due to a first muscular source which is non-stationary and partly due to a second muscular source which is stationary, characterised in that the apparatus incorporates:

a) a first set of low-noise signal electrodes for placing externally upon a patient's skin for detection of stationary and non-stationary muscular activity, the first set of low-noise signal electrodes being suitable for localisation sufficiently such that:

i) their muscular signal contributions associated with the first muscular source will simulate a single stationary source to a blind signal separation technique despite the non-stationarity of the first muscular source, and

ii) the number of sources detected by the blind signal separation technique will not be more than the number of signal electrodes in the first set thereof;

b) a second set of low-noise signal electrodes for placing externally upon a patient's skin for detection of stationary muscular activity;

c) <u>electronic signal</u> processing ~~means~~ <u>circuitry</u> for processing signals received from the first and second sets of low-noise signal electrodes into digital signals suitable for application of a computer-implemented blind signal separation technique; and

d) computer apparatus programmed to implement a blind signal separation technique suitable for separating stationary signals, and to use the technique to:

i) process digital signals derived from signals received from the first set of low-noise signal electrodes in order to separate non-stationary activity associated with the first muscular source, and

ii) process digital signals derived from signals received from the first and second sets of low-noise signal electrodes in order to separate stationary activity associated with the second muscular source, and

e) a display device for displaying the separated muscular source to a user.

20. (Previously presented) An apparatus according to Claim 19 wherein the computer apparatus is programmed to:

a) apply a first filtering procedure to digital signals derived from signals received from the first set of low-noise signal electrodes in order to derive uterine activity, and

b) apply a second filtering procedure to digital signals derived from signals received from the first and second sets of low-noise signal electrodes in order to derive cardiac activity.